"THE TAYINAT GEOMAGNETIC SURVEY, 2003"

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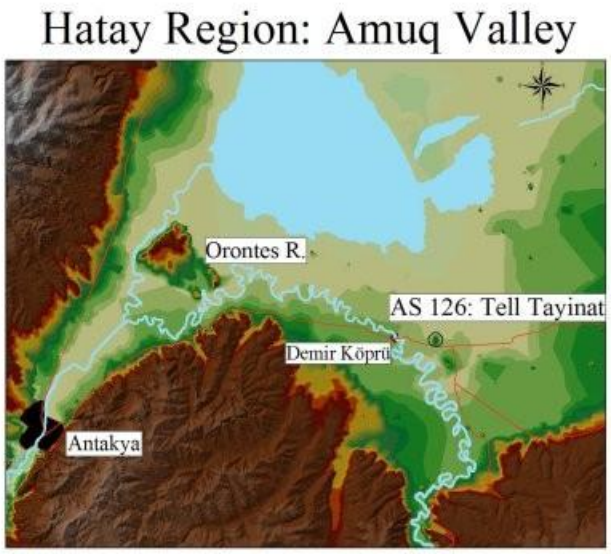
INTRODUCTION



The Ta'yinat Archaeological Project (TAP) represents part of an ongoing regional research effort investigating the historical development of urban institutions and the rise of early state societies in the ancient Near East. More specifically, TAP was conceived within the framework of the Amuq Valley Regional Project (AVRP), which has been systematically documenting the archaeology of the Amuk Plain, in southeastern Turkey, since 1995. This explicitly regional project, still a relative rarity in the field of Near Eastern Archaeology, seeks to facilitate a multi-scalar approach to the investigation of the complex social, economic and political institutions developed by the first urban communities to emerge in this part of the ancient world. As first revealed by the investigations of the University of Chicago in the 1930s, Tell Ta'yinat preserves the extensive remains of the Neo-Hittite/Luwian capital Kunulua. Within the broader framework of the regional perspective articulated by the AVRP, therefore, the TAP investigations were initiated for the specific purpose of documenting the archaeological record preserved at this important settlement, located on the southern edge of the Amik Ovasi.

Due to the considerable size and importance of Tell Ta‘yinat, TAP was conceived and initiated as a long-term project, committed to fully and systematically documenting the archaeological record preserved at the site. Given the extensive architectural remains preserved on the site, conservation will also play a central role in the project. Furthermore, these remains will be linked to the original Chicago excavations, with the aim of producing a final report that integrates the results of both projects in a comprehensive monograph series.

The specific goals of the current phase of TAP are (1) to create a computerized base map (using GIS software technology) clearly defining the settlement parameters and topography of the site, (2) to document all visible architectural remains on the site, (3) to document the settlement history of the site through the assemblage of extensive, quantifiable collections of surface artifactual remains, (4) to document sub-surface remains utilizing remote sensing technology (both satellite imagery and ground-penetrating techniques), and (5) to integrate these architectural and artifact records in a comprehensive relational database that will permit the detailed regional comparative analyses necessary to address the broader research objectives of the project referred to above. The first three goals were the focus of field seasons conducted as part of the AVRP Survey. The surface artifact (#3) and architectural (#2) surveys were completed in 1999, and the topographic survey (#1) was completed in 2001 (for more thorough descriptions of these field seasons, see previous reports in Arastirma Sonuçlari Toplantisi).

The 2003 field season was devoted primarily to completing the remote sensing survey (project goal #4) begun in 2002. In addition, work was initiated on the construction of a comprehensive relational database (project goal #5) for the site, linking the topographic and architectural record with artifact inventories from both past and present field work at Tell Ta‘yinat, including artifact collections preserved in the Antakya Museum. The 2003 season was conducted between July 30 and August 26. The survey team consisted of Dr. Timothy Harrison (Project Director), Dr. Laurence Pavlish (Geophysical Specialist), Fiona Haughey (Object Illustrator), Alper Basiran, Stephen Batiuk, and Dr. David Lipovitch. Ms. Güner Sagir, of the Directorate of Cultural Heritage and Museums, served as government representative.

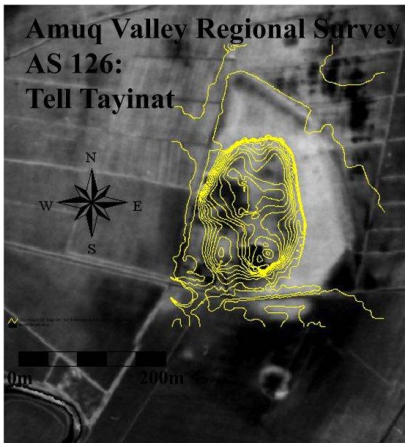
PREVIOUS INVESTIGATIONS AT TELL TA‘YINAT

Today, Tell Ta‘yinat forms a large, low-lying mound 1.5 km east of Demirköprü on the northern bend of the Asi River, at the point where it turns west and winds around the southern edge of the Amik Ovasi . The site consists of an upper and lower mound, with the lower mound now hidden by a thick alluvial accumulation characteristic of the Orontes floodplain within the Amuq. The upper mound sits just north of the modern Antakya-Reyhanli road, and measures approximately 400 m (E-W) by 500 m (N-S).

Tell Ta‘yinat was the scene of large-scale excavations in the 1930s, conducted as part of the University of Chicago’s Syro-Hittite Expedition (for a more thorough description of these investigations, see previous reports in Arastirma Sonuçlari Toplantisi). The excavations of the Chicago Expedition demonstrated that the upper mound preserves a lengthy settlement history that spans the Early Bronze and Iron Age periods. In addition, epigraphic finds (both

Luwian/Neo-Hittite and Aramaic) made by the Chicago Expedition identified the site as ancient Kunulua, capital of the Neo-Hittite/Aramaean Kingdom of Patina/Unqi. Since the results of these excavations remain largely unpublished, however, the Ta'yinat Archaeological Project was initiated in part to document more thoroughly the extensive archaeological record preserved at this important site, and to produce a final report that incorporates the results of the renewed investigations with the work of the Chicago Expedition.

In addition to the upper mound, sherd density distributions, recorded by means of walking transects conducted during the 1999 AVRP Survey field season, have delineated successfully the parameters of an extensive lower mound. This lower mound extended north of the upper mound approximately 200 m, and east approximately 100 m, bringing the overall size of the site to 500 x 700 m (or 35 ha). These measurements differ slightly from those of the Chicago excavation team, who estimated the size of the site at 500 x 620 m, but match the earlier estimates of the Braidwood survey. The surface sherd collection indicates that settlement expansion occurred in the lower mound during the Iron Age, most likely corresponding with the Second Building Period (ca. 9th-8th Centuries B.C.) identified by the Chicago excavations.



A Corona satellite image of the site confirms the settlement pattern delineated by the 1999 surface survey, with a clearly discernable "shadow" documenting the northward and eastward extension of the lower mound. When the topographic survey results were overlaid, a further correspondence was evident. The high sherd densities recorded by the pedestrian transects declined at almost the precise point delimited by a contour in the topographic profile of the site, and the shadow reflected on the satellite image. Thus, the results of the 1999 and 2001 AVRP Survey seasons not only confirmed the regional predominance of Tell Ta'yinat during the third and first millennia, but demonstrated that considerable portions of the site remained to be investigated, and should be the focus of any future effort to document the history of the Amik Ovasi during these cultural periods.

THE REMOTE SENSING SURVEY

Magnetometry

Given the considerable size of Tell Ta'yinat, its complex settlement history, and the extensive excavations conducted previously at the site, a remote sensing survey was considered the most prudent and effective way to assess the archaeological potential of the various components of the site. When combined with the results of the topographic and surface surveys, these layered data (integrated with the GIS-formatted relational database) will permit focused investigations of those specific areas of the site, such as the West Central Area, which have indicated the greatest archaeological potential. This will then make it feasible to conduct targeted excavations in those areas considered to have the greatest archaeological potential and importance.

The primary goal of the 2002 field season, therefore, was to conduct a preliminary pilot study, and determine the most effective remote sensing method (and strategy) to use in the field at Ta'yinat, before embarking on a more comprehensive survey of the site. As a relatively low-cost yet effective (and widely used) remote-sensing technique, magnetometry was our first choice for the pilot study. Our primary concern was whether we would be able to isolate the magnetic lateral contrast created by settlement structures against the background noise of local geophysical conditions. Accordingly, a 7 ha area in the northeast sector of the lower settlement was marked off and mapped by pacing east west transects spaced approximately 1 m apart, carrying a hand-held magnetometer. To provide a control, a second magnetometer was set up as a base station. In all, more than 600 pedestrian transects were completed, and more than 195,000 magnetic readings recorded, with a coverage density of approximately one reading every 0.5 m.

The results of the 2002 Magnetometry Survey exceeded expectations, and permitted a number of crucial preliminary observations. Most importantly, the magnetometer succeeded in recording numerous magnetic anomalies that appear to represent artificial, rather than natural, sub-surface features. Moreover, when the magnetic data were plotted spatially, these anomalies consistently translated into sharply delineated angular, or rectilinear features. Furthermore, these rectilinear features appear to form coherent structures or sets of structures, and when geo-referenced with the site base map, they appear to form a composite plan with a shared gradient and orientation toward the northeast. The positive results of the 2002 magnetometry survey, therefore, clearly validated the use of magnetometry as an effective remote sensing technique at Tell Ta'yinat, and called for an expansion of the preliminary pilot study.

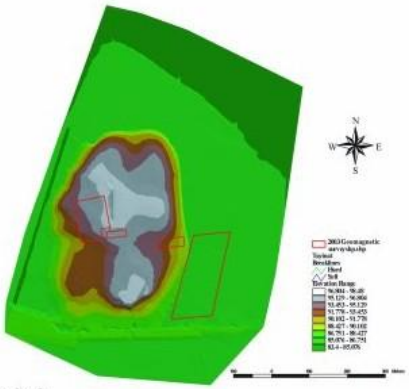
The 2003 Magnetometry Survey

Consequently, from August 13 to 22, a proton magnetometer was used to survey the remaining portions of the lower mound, as well as significant portions of the upper mound. More specifically, four areas of the site were examined: 1) the southern portion of the lower mound (225 m X 104 + 9 m), the West Central Area excavated by the Chicago Expedition in the 1930s (100 m X 100 + 25 m), 3) a present day "garden plot" east of the West Central Area (50 m X 17 m), and 4) an area on the east side of the upper mound that approximately covers the Area VII excavations of the Chicago Expedition (75 m X 25 m) (see Figure 5). Dense crop coverage at the time of the survey unfortunately prevented any remote sensing of the northern extent of the lower mound.

In all, the 2003 Magnetometry Survey completed 765 transects, covering approximately 75 linear kilometers, and resulted in the recording of 157,000 readings. Approximately 3.5 ha were surveyed at a natural grid density of 0.5 m X 0.5 m. When compared to the 0.5 m X 1 m grid density of the 2002 Magnetometry Survey, this represents an equivalent coverage density of 7 ha. Together, the two survey seasons therefore have achieved coverage of approximately 30 percent of the entire site, encompassing both lower and upper mounds.

Although a comprehensive analysis of the 2003 magnetometry data is still ongoing, the preliminary data processing and analytical results indicate that the magnetometer succeeded in

recording numerous additional magnetic anomalies, including a series of large circular features in the center of the lower mound's eastern sector.



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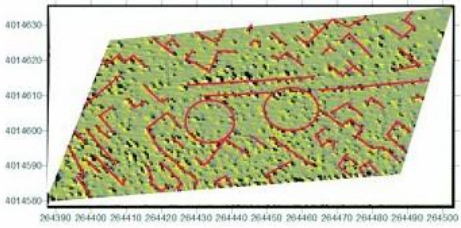

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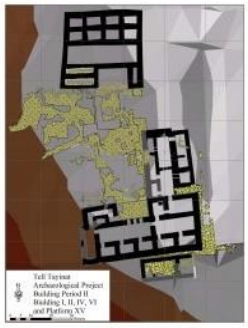

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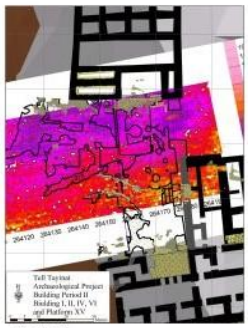

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ANTAKYA MUSEUM ARTIFACT DOCUMENTATION

Concurrent with the magnetometry survey, work was initiated on a database of all artifacts from past and present field investigations at Tell Ta'yinat. The goal of this effort is to link this artifact data to the topographic and architectural record produced by the survey, in order to create a comprehensive relational database for Tell Ta'yinat that will permit the detailed comparative analyses necessary to address the broader research objectives of the project. During the 2003 season, therefore, work commenced on the creation of an inventory of all artifacts accessioned in the Antakya Museum from the excavations of the Chicago Expedition at Tell Ta'yinat, conducted in the 1930s. A preliminary review of the museum accession registers in 2002 identified 454 objects attributed to Tell Ta'yinat. Since this material remains largely unpublished, it was decided that the inventory effort should also include a thorough documentation of each artifact. Accordingly each item was photographed, and detailed line drawings were made of selected whole objects.

In all, the 2003 season succeeded in documenting more than 200 objects from the Chicago excavations, or approximately half of the items recorded in the Antakya Museum accession records. A complete digital photographic record of all the Ta'yinat Objects was submitted to the

Museum at the end of the season. It is anticipated that this documentation effort will be completed during the upcoming 2004 field season.

CONCLUDING OBSERVATIONS

The positive results of the 2002 and 2003 survey seasons clearly validated the choice of magnetometry as a low-cost, yet highly effective (and efficient) geophysical remote sensing method. In each of the areas covered, the magnetometry results indicated the existence of substantial, well-preserved architectural remains. According to the original Chicago excavations, the settlement at Ta'yinat expanded off the upper mound and into the lower city during the Second Building Period. As noted earlier, the epigraphic evidence would appear to assign this phase in the settlement history of the site to the late ninth and eighth centuries B.C., while confirming its identification with ancient Kunulua, capital of the Neo-Hittite/Aramaean Kingdom of Patina/Unqi. The magnetometry survey, as well as the Antakya Museum inventory effort, therefore, have helped to lay the groundwork for a more systematic investigation of the cultural remains preserved in both the upper and lower mounds at Tell Ta'yinat during this important phase in its settlement history.

ACKNOWLEDGMENTS

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